

Abstract

An improved process for enhancing the plant nutrient value of relatively low analysis organic waste material (*e.g.*, sewage sludge) involves treating the waste material with an acid and base in a pipe-cross reactor. The process more particularly involves mixing the waste material with water to form a slurry (or initially taking the waste material as a slurry); pumping the slurry to a pipe-cross reactor for reaction with a base, acid, and water to form a melt; spraying the melt onto a recycling bed of fines in a granulator, and flashing off the water contained in the melt as steam; rolling the melt onto recycled fine particles in a granulator to form granulated particles; and drying these granulated particles to form an enhanced plant nutrient value composition (*e.g.*, a fertilizer or soil conditioner having a greater "NPK" value than the original relatively low analysis organic waste material). The invention also includes fertilizers produced according to the improved process, which fertilizers are of the same size and shape and density of commonly used fertilizers. The method advantageously utilizes the heat generated by the exothermic acid-base reaction in the pipe-cross reactor to remove the approximately 80% water from sludge, thus saving large amounts of energy normally used in conventional drying or burning methods, while, at the same time, conserving the intrinsic values of the nutrients and humates contained in the sludge. In one embodiment, the process includes a method of disposing of spent acid from a hot dip galvanizing process or a steel pickling process involving incorporating the spent acid to maintain the low pH of a venturi scrubber used in the improved process.